e-Michigan Web Development

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Usability Guidelines for e-Government Applications

Methods, best practices and resources for creating high performance web sites and applications

MICHIGAN DEPARTMENT OF
INFORMATION
TECHNOLOGY

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Usability Guidelines for e Government

Important Usability Features to be Included with Applications

Usability for the Web

The Look and Feel Standards document would be an incomplete if it did not include guidance on how to achieve better usability within the applications produced for the State of Michigan.

Most Project Managers and web Development Teams would agree that the application body area is the "work horse" of the application. They would further agree that ease of use and GUI design would be a valuable component to any project. However many designs fail to meet even minimum usability standards when deploying even the most sophisticated technology, regardless of the amount of money spent.

One of the reasons for this general failure is the interpretation surrounding the concept of usability or ergonomics. Some have likened usability to asking, "What's your favorite color?" Almost everyone has an answer.

Making something with "good" design is very hard to define. There has been a growing body of knowledge about the discipline of usability however. So much so that many of the traditional colleges and universities now offer courses and advanced degrees in ergonomics, referred to as the science of "user friendliness", specifically targeted towards information technology and software design and development.

Driving this need for improved web site performance is a society accustomed to ever-greater use of electronic means to communicate. From cell phones to Wi-Fi and Broad Band access, efforts surrounding the idea of "web sites that are easy to use" have grown in awareness and need – and are often measured in traffic figures.

Average Web Usage, U.S., April 2003		
	Home	**Work**
Number of Sessions/Visits Per Month	30	67
Number of Domains Visited Per Month	52	99
Time Spent Per Month	25:13:52	76:13:10
Time Spent During Web Visit	00:31:48	00:33:11
Duration of a Web Page Viewed	00:00:55	00:00:59
Source: Nielsen//NetRatings		

The single biggest problem with defining usability standards lies within the applications themselves. No two are alike, and especially when organizations like state government, begin to look out across their enterprise of on line services they realize the huge task before them.

Usability is also difficult to measure, especially in terms of dollars. When applications that pay no attention to usability issues are compared to those that do, most have a difficult time in pointing out the difference in Return On Investment (ROI). Another way of looking at the issue is Cost Avoidance.

> The best scenario for managing usability standards starts with the basics: acknowledgement that usability exists.

There is no practical way to measure "ease of use", but some scientific ones are starting to emerge. Suffice it to say that if you added all the time users spend searching for misplaced navigation, poorly written instructions and aggravated phone calls in an attempt to ask questions about the on-line service, the numbers do add up.

Recently, however, more and more research is being done to find a way to "compute" the ROI on sites that include usability in their project plans and those that don't. Additionally, the types of development performed by groups with different interests also affects how ROI is measured.

For example, government IT projects are caught up in yearly budget cycles, which tend to mask the performance results of sites launched within a particular fiscal year. Sites may also be launched but without follow through by the Project Manager or Development Team, so efforts to measure the effects of the on-line service as compared to the replaced version or paper process are ineffective.

The following article does a very good job of encapsulating ROI for usability as it relates to the project plan. It also attempts to make the case for usability as a means to measure the performance of the site. For web sites that utilize this method, the numbers speak volumes.

Usability standards can't guarantee this kind of ROI, but these metrics represent some of the latest reasons why it makes good "dollars and cents" to make usability a part of the design process.

Return on Investment for Usability

What is the value of increased customer satisfaction?

Summary:
Development projects should spend 10% of their budget on usability. Following a usability redesign, web sites increase usability by 135% on average; intranets improve slightly less.

Ease of use doesn't come from wishful thinking. It comes from conducting systematic usability engineering activities throughout the project lifecycle. This is real work and costs real money, though not as much as some people fear.

Usability Costs

To assess the total cost of usability we collected data from 863 design projects that included usability activities. Depending on how we estimated it, usability costs were between 8% and 13% of the projects' budget. Based on this finding and findings from other surveys, we conclude that current best practices call for devoting about 10% of a project's budget to usability.

In essence, the cost of usability doesn't increase linearly with project size, since many usability activities cost about the same, regardless of how big the project is. A project that's ten times bigger, for example, typically requires only four times more usability spending.

Usability Benefits

We analyzed data from 42 cases where usability metrics were available for web site redesigns. For the purpose of our analysis, we needed projects that collected the same metric both before and after the redesign so that we could accurately compare them and estimate the percentage improvement in usability.

Averaged across the 42 pairs of measures we found, usability increased by 135% when we excluded five outliers with exceptionally big usability improvements. (If we include these outliers, the average improvement jumps to 202%.) The improvement in usability metrics differed depending on the metric, as the following table shows:

Metric	Improvement
Sales / conversion rate	100%
Traffic / visitor count	150%
User performance / productivity	161%
Use of specific (target) features	202%

Estimating ROI

> In terms of gross averages, I estimate that spending about 10% of a project's budget on usability activities doubles usability.

Unfortunately, such estimates do not produce an ROI number in the classic sense, because the two parameters are measured in different units:

- Project cost is measured in money

- Usability is measured in increased use

Converting usability improvements to dollars is easy for e-commerce, where doubled sales have an immediate value. For intranets, productivity gains are also easy to convert into monetary estimates: simply multiply the time saved by the hourly cost of your employees.

Other types of design projects are harder to convert into an exact ROI. What is the value of increased customer satisfaction? Of more traffic or increased use of your web site's target features? Those estimates vary between companies, and thus the monetary value of doubled usability also varies. But it will be substantial in most cases.

Typically, the more people use a design, the bigger the usability ROI since the benefits come from the added value that ease of use brings to each user. Doubling sales on a large e-commerce site obviously results in bigger numbers than on a small one.

Similarly, the estimated productivity gains from redesigning an intranet to improve usability are 8 times bigger than the costs for a company with 1,000 employees, 20 times bigger for a company with 10,000 employees, and 50 times bigger for a company with 100,000 employees.

Because usability gains far exceed the costs, I believe that the budget share allocated to usability will increase in the future, at least in big companies.

> Currently, I recommend spending 10% of a project's budget on usability, but within a few years optimal ROI will probably require spending 20% or more. Obviously, there is a point at which the value from extra spending on usability will be less than the value of extra spending on other project components. However, I don't know where that point of diminishing returns will be, since we're nowhere near it in current practice. [1]

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[1] Excerpted from Jakob Nielsen's (http://www.useit.com/alertbox) **Alertbox, January 7, 2003**

Usability issues Unique to State Government

Typically Project Managers and Development Teams all agree that on line services should get the job done while being easy to use. Unique to many state government IT projects is the idea that transferring complex, paper based processes to the Internet will streamline agency operations and reduce the cost of overhead, all while increasing customer satisfaction by opening another communication or transaction channel.

Creating another Channel - From Paper to On Line

One of the goals of many application designs is to move a complex State paper process to an on-line version, thereby reducing costs and improving the efficiency of state services. As most projects go, the process is indeed transferred to the Internet so that it is now "on line". However cost savings (for the ever famous ROI) are seldom (or difficult at best) realized because of several factors:

- The original paper process remains in place

    o The process is so well entrenched both within the state and with the customers served that substitution with the on-line process is not considered feasible

    o Many IT projects follow a Phased approach and accomplish only a percentage of the total process

- The on-line process is an additional channel for service delivery

- The costs of the original paper process is difficult to estimate

    o Many state services are part of existing programs or merged with other grants or funding dollars from other agencies or the federal government

    o On-line costs, although more clearly accounted for, are inconclusive because a one-to-one comparison cannot be made

- Many IT project plans fail to include the cost of maintenance of the system after launch to production

The result is agencies essentially add to the processes that already exist, creating yet another channel of customer service or delivery. This factor tends to consume any cost savings that may be realized by the on-line process. Additionally, the state rarely charges usage or convenience fees with the on-line service, so costs are never recovered through traditional fee for service methods.

Additionally, code maintenance, debugging, hosting and related maintenance costs, combined with even more users who will contact agencies with questions and problems add to the cost of doing business on-line. Since there are now two ways to process the same information, paper and on line, agencies never seem to feel the benefits of more technology.

Many applications meet the goal of reducing the number of paper forms or duplicate database entries, but the goal of reduced overhead is often missed. If usability is also excluded from the design process, customer satisfaction is also lost!

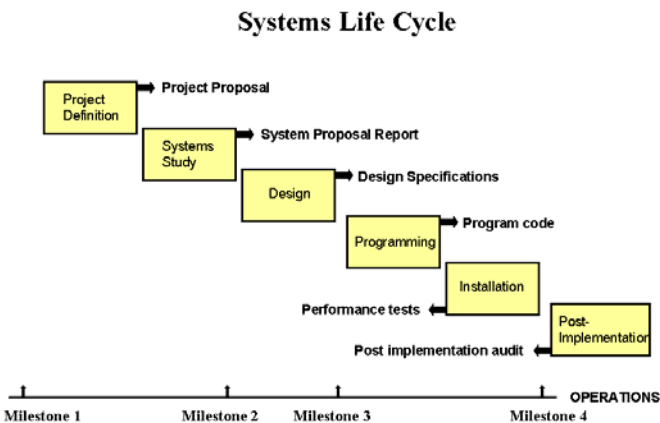## Achieving Usability – Iterative Design Process

Good usability can go a long way in solving problems before they occur. It can help reduce the amount of time agencies spend on customer issues and complaints, reduce training time for both staff and customer, and increase overall customer satisfaction.

Good usability can also move users away from the old process faster and increase the adoption rate of the on line process, getting closer to streamlining the agencies internal processes.

There are some defined standards that can help most web applications become better, and there are many resources available that can help guide developers to implementing what's best for their site overall.

Traditionally, the best usability standards are the ones that work for a specific site. That's why even the highest paid usability consultants would rather review a site personally than attempt to write a definitive guide on how best to achieve it.

Many project management methodologies treat the application design process as most any other project – as a series of linear progressions that can be done serially or in a tandem, parallel relationship.

Systems Life Cycle

Project Definition → Project Proposal

Systems Study → System Proposal Report

Design → Design Specifications

Programming → Program code

Installation

Performance tests

Post-Implementation

Post implementation audit

OPERATIONS

Milestone 1   Milestone 2   Milestone 3   Milestone 4

These linear approaches tend to avoid anything that would push the project "backward". In other words, returning to the design phase to address a missed item or issue is seen as regression, and adversely affects the delivery schedule of the project.

By using an Iterative Design Process that is built into the project plan however will help achieve greater usability without sacrificing cost or time. Using prototype design methods early in the process along with early, successive usability and user acceptance testing can prove to be the most effective way to achieve both scheduled delivery and high degree of usability.

Prototype designing, reviewing, testing and modifying applications as part of an overall **Iterative Design Process** within the project plan before applications are launched is the best way to approach both usability and user acceptance testing.

Building this process into the project plan as an integrated effort, rather than as a last resort, will yield the biggest gain for applications built for the State of Michigan.

The following illustration details the Iterative Design Process using traditional project plan milestones. This approach is best illustrated however as a spiral rather than a linear diagram.

The reason for this is that UAT, which normally occurs at the end of the project plan, has been shifted towards the beginning. Since UAT tends to overlap with User Interface Design issues, it has been incorporated into the Iterative Design Process of the project.

Paper prototyping has also been added to the process at the very start of this stage, to allow design ideas and solutions to be more easily adapted to the Requirements and Functional specifications. This entire process is cyclical, and is repeated as often as necessary until the design solution meets as many of the requirements as possible. Ideally, it would satisfy 100% of them.

A final UAT occurs at the end of the project as usual. During the final UAT however, the test becomes as it is intended, more of a final sign off and functional verification rather than a design review. This process helps avoid the delays and costly over-runs normally associated with UAT,

By incorporating the Iterative Design Process into a formal project plan, it furthers the ability of Project Managers and Development Teams to more easily accommodate usability and user acceptance changes to the design.
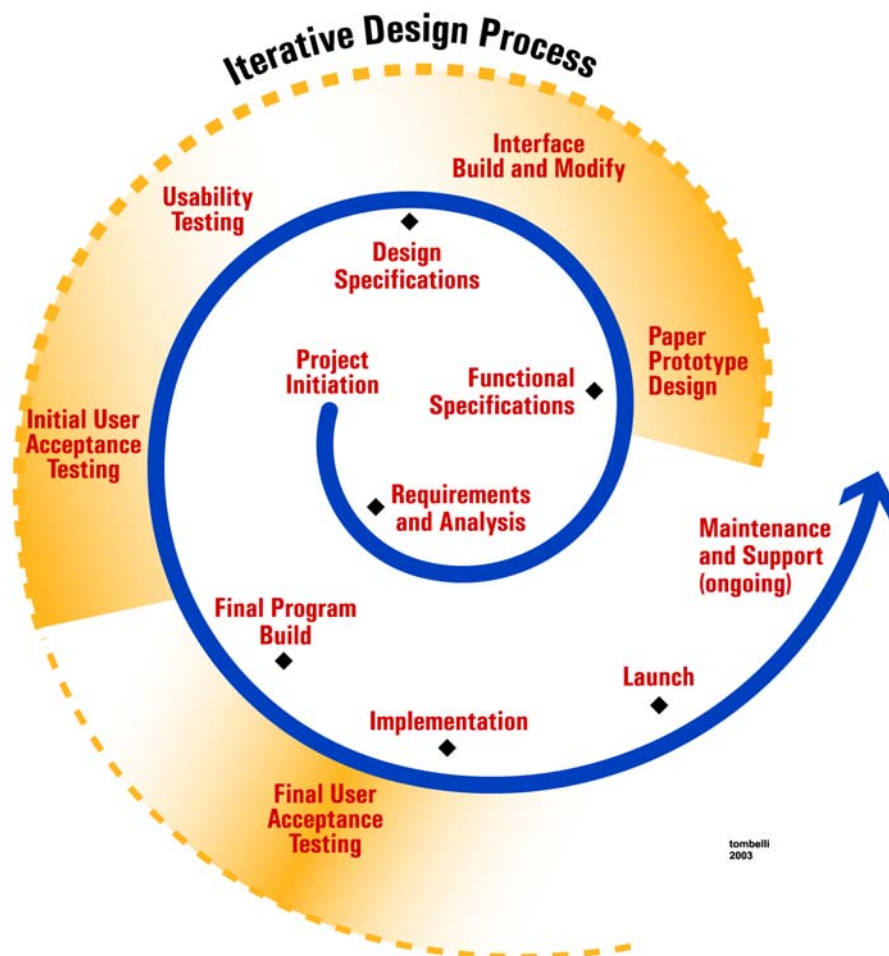
Usability Design and User Acceptance Testing

Usability is often looked upon as the last stop before a web application and software design launches into production. Along with User Acceptance Testing (UAT), it is usually relegated to the last portion of a project plan just prior to launch, if at all.

Many Project Managers and web Development Teams alike confuse Usability with UAT. Although UAT should be a must for any project plan, even that portion of the plan is often overlooked or squeezed as the project nears the deadline for completion. If there's time to compress the schedule, then UAT will likely take a hit. Interestingly enough, it's at that very point in the project plan that the business owners get to take a test drive, most often for the very first time.

IF there is time for UAT, it is often a "check the box" procedure for functional deliverables rather than effective testing for anything beyond. Project Managers and Development Teams are under pressure to complete the projects and vendors want to get paid for their work – for both UAT and/or Usability is often just the last stop in the project plan.

Some UAT test plans can read as simply as this:

Does the application have security?	YES
Does the form submit the data?	YES
Can the user identify the home page link?	HOME PAGE?

Most Project Managers and Web Development Teams know that UAT usually creates changes to the application design (which it should), which is why it's also avoided as much as it is because it's done at the wrong time – the end of the project.

The same is true for usability, only double. UAT allows the users to finally maneuver the site, enter data into the forms, click the submit button or search for content. Invariably, the testers will also find usability errors at the same time, to the frustration of Project Managers and developers alike.

Issues like:
- Consistent placement and design of navigation elements
- Overall alignment of text entry fields, forms and buttons
- User instructions, help menus, general instructional writing
- Screen sizes, colors, text sizing, buttons

Typically, UAT issues make there way back to the Project Manager. They read them and try to find ways to accommodate them as best they can – but any changes to the design that significantly impact the time line are seen as unnecessary and therefore attempts are made to minimize the value of the requested changes in the eyes of the business owner.

It's usually the job of the Project Manager to sort through results of UAT and determine which UAT issues are a "priority" and which ones can be accomplished in "Phase 2" – this usually means they are set aside indefinitely.

Customer Focus, Usability and the Interactive Experience

Usability + Functionality = 1

Managerial and technical staffs, including Project Managers, subject matter experts, and Development Teams are strongly encouraged to consider usability issues early in the design process, when gathering or preparing functional design specifications or preparing detailed design documentation.

The entire Michigan.gov movement (as also seen in many of the best web sites today) has moved towards on line services that utilize a customer-focused methodology. This methodology puts the customer at the center of the interactive experience. More importantly, it is the combination of both powerful functionality and usability create the most compelling sites. One without the other yields sites that do some part very well, yet lack the overall capacity to increase usage and adoption rates while compelling users to return for more.

> It is up to Project Managers and web Development Teams to insure that the functional requirements of the application are not the only measure of a successful implementation.

Most designs go through a detailed analysis and functional requirements phase where the customer articulates the business rules and legal requirements (if any) of the application. They proceed to design specifications that include a loosely defined Graphic User Interface (GUI).

After that, construction begins with code development and the application begins to emerge. After getting bogged down in design flaws, unforeseen functionality and technology issues plus time and money constraints however, the user interface issues take on a secondary position underneath the process. They are dramatically revealed by the user however at the time of the regularly scheduled User Testing.

By addressing both design and functionality together as part of the process, the results are closer to what users have come to expect from the sites they frequent: powerful interactive and informational experiences with easy to use and fast, friendly service. By combining these efforts, the sites gain the power to bring users back again and again. Without this approach, the site suffers from an imbalance of one or the other.

The Best of Both Worlds

The following illustration attempts to show how the best of both worlds is the best solution to designing any application.

If application project plans include adequate iterative design processes, paper prototyping, usability guidelines and look and feel compliance, the application will likely be viewed as very successful. Users will return again and again because it delivers on all fronts.

Although there are always many other factors that determine the success of an application, following this basic premise will lead to a far greater solution that focusing on only a certain aspect of the functionality.
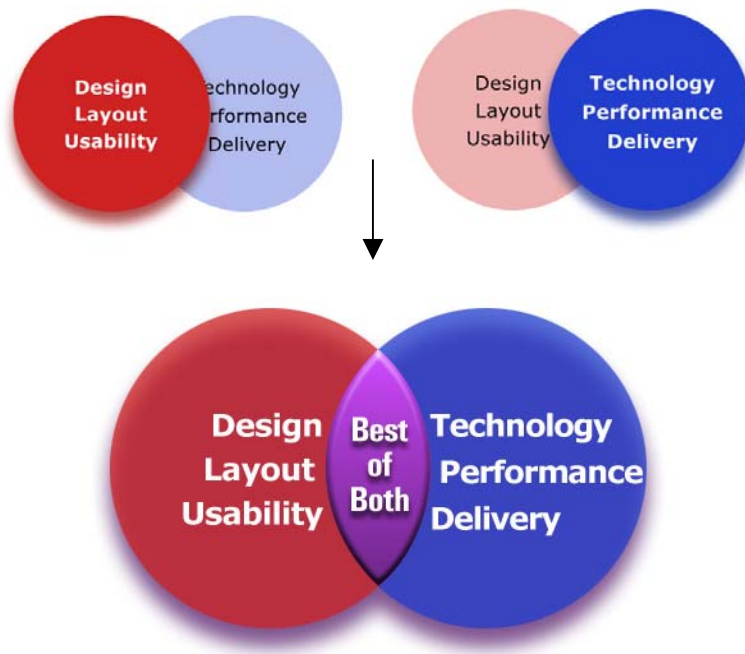
Effective Types of GUI Standards[2]
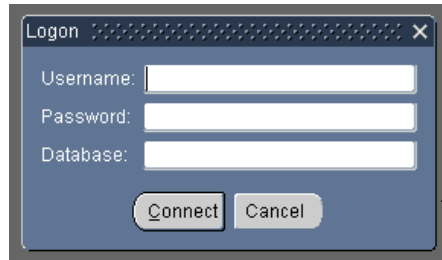
When considering how to apply effective User Interface and Usability standards to any given application deign, consider these basic approaches:

> **Some consider this an effective home page**

1. **Methodological Standards**: Tasks that Development Teams should complete to create "usable" systems during the design phase

    a. User Interviews

    b. Task Analysis

    c. Task Design

2. **Design Standards (this document)**: Consider this the "Building Code" of the application. These are a set of legal requirements that affect the consistency of all on line services and applications produced by the state of Michigan

    a. Functional browser display area of 740 pixels

    b. Banner Header and Michigan.gov branding elements

    c. Sub-header links and location

    d. Footer links and location

    e. Navigational location and consistency

3. **Design Principles**: These help Development Teams build better sites by using effective writing techniques when creating body content

    a. Use short words that any average user can understand

    b. Use short sentences when possible to help clearly define instructions and meanings

    c. Write in the "active" voice rather than the "passive" voice. **Active voice is the best way to identify who is responsible for what action**:

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[2] How To Develop an Effective GUI Standard, 1993 by Dr. Eric M. Schaffer, Human Factors International, Inc.

Remember - passive sentences often do not identify **who** is performing the action. **To communicate effectively, write the strong majority of your sentences in the active voice.**

Writing for the Web

Examples of Passive vs. Active voice

Passive Voice	Active Voice
New regulations were proposed.	*We proposed new regulations.*
The following information must be included in the application before it is considered complete.	*You must include the following information to complete your application.*
Bonds will be withheld in cases of non-compliance with all permits and conditions.	*We will withhold your bond if you don't comply with all permit terms and conditions.*
New regulations have been proposed by the Department of Veteran's Affairs.	*We have proposed new regulations.*
The permit will be approved by the agency's State office.	*Our State office must approve your permit.*

Design Features that create Usability

It is recommended that designs (especially primary and introductory home pages) attempt to include important information about the application itself, special features of the application and describe the intended audience, especially above the fold line (450 pixels).

Pages that simply present the Username and Password entry fields on the home page forgo any attempt to communicate important issues with the application or inform intended audiences of any special information or requirements needed to complete the transaction. Examples such as:

Usability issues include but are not limited to:
  a. Above the fold placement of critical content
  b. Position, alignment and clarity of functional objects like:
    - Drop down lists
    - Text field areas
    - Username and password fields
    - Radio buttons
    - Search and Submit buttons
  c. Link availability and placement

d. Navigation issues and placement
e. Best-practice usability guidelines

What's New Information
a. Recently revised portions of the application
b. Help issues and where to go for answers to questions
c. Related links or supporting information
d. What levels of security are required (browser versions etc.)?
e. How is the information protected?

Examples of required documentation that may needed to perform the transaction
a. Employer ID number(s)
b. Credit Card number(s)
c. One or More SSN's
d. Drivers License Number(s)
e. Federal ID Number(s)
f. Previous Loan or Application number(s)
g. Other confidential information that was mailed by the sate

Transaction Information
a. Describe what the on line transaction is exactly, in plain English
    - Who is responsible state agency (or agencies) for this process? Under what law or authority?
    - Why is this process needed? What benefit is it to the user?
    - How is the on-line method an improvement to the "old way" of doing it? What's better, faster, cheaper?
    - Is the state saving customer's time or money? How much?
b. What is the intended outcome?
    - A completed PDF form for printing and mailing back to the state?
    - A confirming order or verification number that users can print?
    - Will something be mailed to them after submitting the information?
c. How long will this transaction take?
    - 5-10 minutes; 30 minutes, more…?
    - If more than 10 minutes, why should it take that long?
d. What happens if the user stops in the middle of the process?
    - Can the user "save" their work during the session to come back later?
    - Will the user loose session data if they use the <BACK> button on their browser?
    - Who to contact if there's a question in the middle or end of the process
    - How can users be sure that the transaction is complete?
    - Leave "bread crumbs" along the top of the body area that help indicate what step they are in the process

Other ways to serve the user include providing areas for "What's New" or other pertinent information that would be difficult to locate without having to navigate to a specific page or section.

Use of link names and text descriptions of certain information or functionality that uses clear, direct language rather than "official" program names and acronyms that average users may not be aware of.

Valuable Usability Resources (FREE)

The following sites are recommended reading for preparing and delivering Ease of Use or Usability designs to the projects you are managing or creating. These sites feature valuable information covering almost all forms of usability systems. Frequent visits to these sites will keep you informed of what's happening.

IBM - Contains a broad overview of design guidelines, tools, services and other relevant materials.   http://www-3.ibm.com/ibm/easy/eou_ext.nsf/Publish/558
Useit.com - Paper **Prototyping**: Getting User Data Before You Code   http://www.useit.com/alertbox/20030414.html
Useit.com - Return on **Investment** for Usability   http://www.useit.com/alertbox/20030107.html
Useit.com - Recruiting Test Participants for **Usability Studies**   http://www.useit.com/alertbox/20030120.html
Human Factors International - **Why Standards** are Necessary? Cool interactive mouse maze that's a fun and informative lesson about consistent navigation   http://www.humanfactors.com/downloads/mousemaze.asp
Human Factors International - **Free Downloads** and Goodies   http://www.humanfactors.com/downloads/default.asp
IA slash - This site (actually an open source blog) **dives deep** into news for information architects. Not for the faint of heart.   http://www.iaslash.org/indexing.php
Pew Internet & American Life Project - Receive the latest trends and original, **academic-quality research** that explores the impact of the Internet on almost everyone.   http://www.pewinternet.org/index.asp
Useit.com - **Top Ten Guidelines for Homepage Usability.** Ten easy steps to make your application homepage a winner   http://www.useit.com/alertbox/20020512.html